Identifying Pathways of Exposure to Toxic Chemicals

Grades

Any

Subjects

Science and Health

Type of Lesson Plan

Lab

Duration

1-2 hours

Materials

- *Household Hazardous Chemicals Checklist*
- *Non-Toxic Alternatives to Hazardous Household Chemicals*
- Mr. Yuk stickers
- Skull and crossbones
- Black light
- Fluorescent lotion
- A dark colored paper cup
- A dark colored cloth napkin
- A carrot
- A black plastic fork

Objectives

TLW…

- Understand the definition of a toxic chemical.
- Identify toxic chemicals that are used in the home.
- Understand how toxic chemicals can get into the body.
- Learn how to reduce exposures to toxic chemicals.
- Identify nontoxic alternatives to hazardous household chemicals.
- Identify sources of toxic chemicals outside the home.

Set

Toxic chemical in our homes

A day or two before the lesson, explain to students that they will identify different types of hazardous chemicals that they use in their home. Send home a hazardous household chemicals checklist with the

students and instruct them to have their parents help them complete it. Remind them to look for the following words or symbols that might indicate that a chemical is hazardous:

- Mr. Yuk symbol
- Skull and crossbones symbol
- Words or symbols indicating that the chemical is flammable, corrosive or explosive
- Caution, Warning, Poison, Toxic, Danger.

When the students have completed their checklists, ask them to share their list with the class. Write the five most common hazardous household chemicals on the board. Have students answer the following questions: What are these chemicals used for? Why are they dangerous? What are some non-hazardous or non-toxic alternatives that they could use instead?

Instructional Input

Chemical Pathways into our Bodies

Ask students if they think using toxic chemicals in their homes is bad for their health and how toxic chemicals can affect the environment and human health. Answers may be that toxic chemicals are sources of pollution that get into our air, water and food and then into our bodies.

Explain to the students that there are three major pathways through which toxic chemicals can get into our body: ingestion (through the mouth), inhalation (through the lungs), and absorption (through the skin). Everyday we inhale oxygen in the air we breathe, however we may also inhale things that are bad for us, like toxic chemicals and air pollution. These toxic chemicals pass through our lungs into our bloodstream.

An example is someone using a spray cleaner to clean the kitchen counters. When sprayed, the chemical cleaner can get into the air and be breathed in. It can also get onto a person's skin. We can also absorb toxic substances through our skin. Some chemicals can destroy skin cells causing rashes and burns and some can even enter our bloodstream by passing through the skin. It is also possible that some of the chemical can get into our food (since it is being sprayed in the kitchen) and accidentally get eaten with the food.

Show students how something can be absorbed, ingested, or inhaled. Ask students to think of how one of the chemicals on their hazardous household chemicals checklist might get into their bodies if they used it at home. Have students share their ideas with the class.

Pathways Demonstration

Explain to students that they will participate in an activity that will show them how a hazardous chemical can get onto their hands, into their food and possibly into their bodies without their knowledge.

Before class, set up three identical workstations (A, B and C) that has a drinking cup, a napkin, a carrot, a fork and a pen.

At the start of the activity, invite three students to participate in the demonstration. Ask the three students to come to the front of the class. Explain to the class that the three students have just finished helping their parent fertilizer the lawn. Tell the class that one of the students was wearing gloves while working in the yard. Ask one student (student C) to put on a pair of plastic, disposable gloves. Then instruct each student to put some lotion (which will fluoresce under a black light) on his or her hands.

Explain to the class that this lotion represents the fertilizer that they were spreading on the lawn. The student with the gloves on will put some lotion on the gloves.

One by one, read a set of instructions to each student and have them follow them exactly. Ask the class to keep track of the differences between the three sets of instructions. The student with gloves must be given instructions C. *(See instructions A, B and C below).* At the end of the demonstration, ask each of the students to use the black light to view their workstation, their hands, their face and the items on their work station to see how much fertilizer (fluorescent lotion) got onto their food and body.

Instructions A.

It is time to have a snack. I want you to follow these instructions exactly.

1. Pick up the cup.
2. Take a sip from the cup.
3. Wipe your mouth with your hand.
4. Pick up the carrot with your hand.
5. Take a bite of the carrot.
6. Wipe your mouth with your hand.
7. Wipe your hands on your napkin.

Instructions B.

It is time to have a snack. I want you to follow these instructions exactly.

1. Go to the sink and wash your hands with soap and water.
2. Dry your hands.
3. Go back to your workstation.
4. Pick up the cup.
5. Take a sip from the cup.
6. Wipe your mouth with your napkin.
7. Use your fork to pick up your carrot.
8. Take a bite of the carrot.
9. Wipe your mouth with your napkin.
10. Wipe your hands on your napkin.

Instructions C.

It is time to have a snack. I want you to follow these instructions exactly.

1. Take off your gloves.
2. Pick up the cup.
3. Take a sip from the cup.
4. Wipe your hands on your napkin.

After the demonstration, ask students how a hazardous chemical might get into their bodies while they are using it. Answers include 1) through accidental ingestion, 2) inhalation, or 3) skin contact. Ask the class to identify the workstation which is most contaminated with fertilizer (fluorescent lotion). Ask them to explain why one workstation was more contaminated than the other was. Based on their observations, ask them to identify things they can do to avoid getting hazardous chemicals on their hands, skin, and food and into their bodies. Answers might include wearing gloves when using toxic chemicals, washing hands before eating, using nontoxic alternatives to toxic chemicals or not using them at all, and using hazardous chemicals outdoors or in the garage.

Closure

Non-toxic alternatives activity

Ask students to come up with alternatives to hazardous household chemicals. They can brainstorm in groups or ask an adult (their parents or grandparents may be good sources). Hand out the information sheet *Non-Toxic Alternatives to Hazardous Household Chemicals*. Ask the students if any of them use any of the alternatives on the list and challenge them to try some of the alternatives to test how well they work.

Toxic chemicals beyond the home

Ask students to list five places that they might find toxic chemicals besides in their homes. Sources of toxic chemicals might include the school cleaning closet, the chemistry classroom, a local industrial site or factory, or a grocery store cleaning product aisle. Challenge students to think of ways that they can reduce contact with or use of toxic chemicals in their lives.

Additional Resources

Glitterbug® Potion fluorescent lotion can be ordered from:

Brevis Corporation
225 West 2855 South
Salt Lake City, Utah 84115
Phone: 1-800-383-3377
http://www.brevis.com/

Household Hazardous Chemicals Checklist

Before starting, ask your parent to help you look through your house to find the products that are used in each of the following areas. Read the label and look for words like **Corrosive, Flammable, Explosive, Toxic, Poison, Danger, Hazardous, Caution,** and **Warning**. These words are clues that the product is hazardous. If the product is hazardous, put a check in the blank to the left of the item. Circle products that you use.

KITCHEN	BATHROOM
_____Oven cleaner _____Floor cleaner & wax _____Ammonia _____Scouring powder _____Bleach _____Other	_____Tub or tile cleaner _____Drain cleaner _____Toilet bowl cleaner _____Medicine _____Air freshener _____Nail polish remover _____Other
LIVING ROOM	**GARAGE, BASEMENT, SHED**
_____Rug cleaner _____Furniture polish _____Air freshener _____Other	_____Oil _____Antifreeze _____Gasoline or other fuel _____Paint _____Varnish _____Glue _____Paint thinner _____Moth balls _____Other
LAUNDRY ROOM	
_____Bleach _____Spot remover _____Detergent _____Other	
GARDEN, LAWN	**OTHER PLACES & ITEMS**
_____Weed killers _____Bug killers _____Fertilizers _____Other	

*Adapted from: BAGS, BEAKERS, AND BARRELS: An Action Curriculum Toward Resolving Hazardous Materials. Industrial State Policy Center and the School of Natural Resources of Michigan, Cleveland, Ohio: 1987.

Non-Toxic Alternatives to Hazardous Household Chemicals

Did you ever wonder what people used before fancy household cleaners were invented? Like, what did your great-great-grandparents use to clean out a clogged drain? Maybe they used some of the cleaning concoctions below. They may take a little more elbow grease and might seem kind of goofy, but they are better for your health and for the environment than some other household chemicals. Remember to use caution even when using "less-toxic" chemicals.

FOR THIS	TRY THIS
Ants in the house	Red chili powder at point of entry, seal off entry
Brass polish	Salt and vinegar or Worcestershire sauce
Carpet cleaner (to remove fresh food stains)	Club soda
Chrome polish	Cider vinegar
Copper cleaner	Lemon juice with a little salt
Disinfectant	Pine oil or dilute chlorine bleach solution
Drain cleaner	1/2 cup baking soda, 1/2 cup vinegar and 2 quarts boiling water
Fertilizer	Compost your fruit and vegetable scraps
Furniture polish	1 tablespoon lemon oil in 1 pint mineral oil
Hand cleaner (to clean off paint or grease)	Baby oil
Floor cleaner	1 cup white vinegar mixed with 2 gallons water
Mosquito repellent	Cedar chips or Citronella candles
Oven cleaner	For baked-on spills, use 2 tablespoons soap plus 2 tablespoons borax plus warm water and steel wool
Paint: oil-based, stains, and sprays	Water-base, non-aerosol paints
Rust stain remover (to get stains out of clothing)	Lemon juice and salt plus sunlight
Clear shoe polish	Banana peel
Silver polish	1 quart warm water, 1 tablespoon baking soda, a piece of aluminum foil and 1 tablespoon salt
Spot remover	Club soda, lemon juice and salt
Window cleaner	2 tablespoons vinegar mixed in 1 quart water

Source: Sally McDole, WSU-Cooperative Extension, Jefferson County, Washington